

January 14, 1997

The Honorable Hazel R. O'Leary
Secretary
Department of Energy
1000 Independence Avenue SW
Washington, D.C., 20585

Dear Secretary O'Leary:

I am writing to request certain information about the Department of Energy (DOE) recent plans to dispose of weapons-grade plutonium by mixing it with uranium to produce a mixed oxide (MOX) fuel and burning it in civilian nuclear reactors.

I am concerned that such a decision would undermine U.S. non-proliferation efforts by reversing a two-decade long policy of not allowing civilian use of military plutonium. This would send a message to other countries that the United States tolerates mixing of its own military and civilian plutonium fuel cycles, thereby impairing the credibility of our efforts to discourage similar activities abroad. Moreover, I am concerned that the transport of military plutonium from weapons sites to fuel processing plants and then to nuclear reactors would increase the risk of theft or diversion, especially since the U.S. is advocating the parallel use of MOX in Russia, where the threat of such theft and diversion is particularly acute. I believe that there exist many important concerns that are addressed inadequately (or not at all) by the Programmatic Environmental Impact Statement (PEIS) released by the DOE in December, 1996. Accordingly, I would appreciate your assistance in answering the following questions:

(1) It is my understanding that MOX has never been made on a significant scale from weapons-grade plutonium before. Since gallium reportedly is used to alloy with weapons-grade plutonium in the pits, since the presence of gallium inhibits the production of MOX, and since currently available purification techniques for removing gallium involve the generation of large quantities of liquid waste containing plutonium, how long do you estimate it will take for the production of MOX from excess weapons plutonium stores to become technologically feasible if a more environmentally sound dry process is to be used?

(2) I also understand that gallium chemically attacks zirconium, and since the fuel is inserted into tubes made of a zirconium alloy, the removal of the gallium from the plutonium is necessary from a safety perspective. How much money will it cost DOE and other U.S. agencies to fund the necessary research to determine how low the level of gallium would have to be to prevent

spent fuel deterioration? Assuming that an aqueous method of gallium removal is pursued, how much low level liquid radioactive waste will be generated from the conversion of surplus plutonium to MOX fuel? How much would be generated if vitrification alone were used? I have been informed that the presence of gallium in the plutonium pits does not inhibit immobilization at all, and moreover, that the technical issues associated with vitrification would be addressable at pilot plants. Given the less challenging technological barriers associated with immobilization, why is this route not being pursued exclusively?

(3) It is my understanding that eighteen utilities have expressed an interest in using MOX fuel in their reactors. Other than the three Palo Verde reactors, owned by the Arizona Public Service Company, which of these utilities are technologically equipped to do so? Have reactor safety issues associated with the higher temperature at which plutonium-containing fuels burn been addressed? If so, please provide details as to the findings of such studies, including the expense and time needed to adequately test any necessary safety features as well as to implement them on an industrial scale. Will the cost of refitting the reactors be subsidized by DOE? How long would it take to make the adaptations required to enable a reactor to burn MOX fuel, and how much will they cost? If DOE has no plans to subsidize the adaptations to the reactors, will the costs of such work end up adding to the plants' so-called stranded costs which utilities may seek to recover from captive utility rate payers? What additional NRC licensing requirements will there be for plants that seek permission to use MOX? How long do you estimate the licensing process to take, and how much will it cost? Does DOE intend to subsidize the utilities' costs of obtaining such licenses? If so, please explain why?

(4) It is my understanding that burning MOX fuel will be more costly than traditional nuclear fuels. Is the DOE considering subsidizing the cost of the fuel to the utility companies that have expressed an interest in using it? Will this subsidy be equal to the difference in cost between that of MOX fuel and that of traditional nuclear fuels? If not, please provide details as to the amount of the subsidy and the reasoning DOE is using to arrive at the value chosen. How much will such a subsidy cost the U.S. per year, and how many years is it expected to last? In light of the deregulation of the electric industry that is likely to occur prior to the enactment of any MOX fuel disposal plan, will DOE increase its subsidization of utilities accepting MOX fuel so as to ensure that they remain competitive and operational in a deregulated energy market? How will DOE prevent such subsidies from giving the utilities that receive them a competitive advantage, or from leading high-cost utilities to continue to operate a nuclear reactor long after it would otherwise have become unfeasible to do so, to the detriment of utility rate payers' interests? Could you provide detailed and specific information as to the size of the so-called "stranded" investments incurred by each of the utilities which have expressed an interest in burning MOX fuel, including the extent to which such costs are attributable to uneconomic investments in nuclear power plants? Would utilities receiving DOE subsidies for burning MOX fuel be required to use these subsidies to mitigate the size of their uneconomic nuclear assets? If not, why not? Why did the DOE assume in its PEIS that there would be no costs other than the added costs of making MOX fuel relative to Low Enriched Uranium (LEU) fuel, in view of the utilities' express statements that they want additional payments (see The Bulletin of the Atomic Scientists, November/December, 1996 issue, page 48-52)?

(5) If the Department's MOX fuel plan is adopted, plutonium reportedly could be shipped from military to civilian facilities in the former Soviet Union, and some reportedly may be shipped from the former Soviet Union to facilities in the U.S. or other countries. In light of growing concern about a black market for plutonium and other nuclear materials, what measures does DOE plan to take to ensure that MOX fuel is not intercepted and stolen? Will the U.S. assist the former Soviet Union in improving its safeguards in the storage and transport of nuclear materials? Has the DOE assessed the increased risks due to the transport of surplus plutonium and/or MOX fuel between military and civilian facilities in the former Soviet Union, as well as within the U.S.? If so, please provide the results of such assessments. If the results of such assessments indicated that there would be an increased risk within the U.S., does the DOE plan to recommend that the reactors that would burn the MOX fuel upgrade their security? If so, would the DOE be willing to pay for part or all of such upgrades?

(6) Russia does not currently have an industrial plant to produce MOX fuel. A report in the November 4, 1996 issue of Nuclear Fuel suggests that a discussion about construction of an internationally funded MOX fuel plant in Russia occurred at a recent meeting in Paris. How much will this plant cost? What other countries have pledged financial support for the project, and what is the magnitude of their pledges? Is the U.S. considering either financial cosponsorship of or technical assistance for this project, and if so, please indicate the amount of money or the nature of the technical assistance under consideration? Assuming any technical assistance occurs, wouldn't this require a nuclear cooperation agreement to be signed between the U.S. and Russia? If not, why not? If so, have such discussions between the U.S. and Russia begun, and how long do you anticipate it will take before an agreement is reached? If such assistance were to be provided by a third party who has entered into a nuclear cooperation agreement with Russia, would prior U.S. consent be required for re-transfer of any U.S.-origin material, technology or information to Russia? Russia has had a reprocessing industry for some time, which recovers plutonium from spent reactor fuels. The U.S. reportedly has stated its intention to limit its use of plutonium for fuel to that obtained from dismantled nuclear weapons. How will the DOE ensure that any plutonium the U.S. receives from Russia is original stockpile material, and not material that has been reprocessed from spent fuel? Won't building a MOX fuel plant in Russia strengthen their reprocessing program by providing an outlet for reprocessed plutonium? How will we be assured that any Russian fuel plant the U.S. subsidizes is not being used to produce MOX fuel from reprocessed plutonium?

(7) The spent fuel produced by burning MOX fuel reportedly is hotter and contains far more plutonium than conventional spent fuel. If this waste is intended for the Yucca Mountain site (or whatever site is designated as the underground repository), how will its acceptance for deposit there affect the overall waste acceptance schedule for other civilian and defense high-level radioactive waste? In light of the greater space requirements that may be necessitated by the higher temperature of the spent fuel, how will the volume of total waste stored in the repository be affected? Is the higher temperature of the spent fuel expected to result in any deterioration of the container vessels, ceramics, or spent fuel rods? Please provide detailed information as to the anticipated storage and safety issues associated with the higher temperature of the spent fuel. Were the costs of disposing of spent MOX fuel anticipated by and provided for in the Nuclear Waste Policy Act? How much would it cost to dispose of the spent MOX fuel, and who would

pay for it? In its PEIS, why did the DOE apparently choose to ignore literature suggesting that MOX spent fuel disposal may cost far more than conventional spent fuel for a variety of reasons?

(8) The DOE reportedly has suggested that Canada might be willing to accept plutonium to burn as fuel in their reactors. Does Canada plan to build a plant to produce MOX fuel? Will the U.S. offer technical assistance or financial support for the construction of such a plant in Canada? If the MOX fuel were produced in the U.S., would Canada have to purchase it from the U.S., and if so, at what cost? Would the U.S. consider paying Canada to take the MOX fuel, and if so, how much would this cost the U.S. each year? How long would it take for Canada to burn all the excess U.S. plutonium? What is Canadian public opinion regarding the use of plutonium as civilian fuel? Which other countries have expressed an interest in burning excess U.S. plutonium? Which countries besides Canada is the U.S. considering for possible shipments of MOX fuel or excess plutonium?

(9) Has the DOE or any other agency undertaken or funded any studies or analyses of reactor safety accidents when MOX fuel is being used? If so, please provide comparative accident probability and consequence data and supply a full copy of all such studies. If not, does DOE plan on carrying out such an analysis in the future? Will the DOE recommend that such analyses be performed as part of the NRC licensing process?

(10) The U.S. has taken the lead in suggesting to Russia that it burn surplus plutonium as MOX in its light water reactors (LWRs). Russian LWRs do not currently meet international safety standards. If MOX fuel is to be burned in Russian LWRs, who will pay for the upgrades needed to bring these reactors up to international safety standards? What licensing process will Russia use to ensure that the DOE is satisfied as to reactor safety? In view of the U.S. advocacy of this approach, do you anticipate that there would be any adverse political repercussions for the U.S. if a Russian LWR using MOX fuel had a nuclear accident? Will the U.S. financially support or offer technical assistance with the construction of new nuclear reactors in Russia if MOX fuel disposal will be one of the functions of these new reactors? If so, please provide all details of such intended financial support or technical assistance.

I appreciate your prompt assistance in providing this information. Should you have any questions about this request, please have your staff contact Dr. Michal Freedhoff or Mr. Jeff Duncan of my staff at 202-225-2836.

Sincerely,

Edward J. Markey
Member of Congress